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PATENT SPECIFICATION

Application Date: Jan. 16, 1936. No. 1378/36. 469,023

Complete Specification Left: Jan. 16, 1937.

Complete Specification Accepted: July 16, 1937.

PROVISIONAL SPECIFICATION

ERRATUM

SPECIFICATION No. 469,023

In the heading on page 1, *insert* "(Patent of Addition to No. 437,969 dated May 12, 1934)"

THE PATENT OFFICE,
23rd August, 1937.

which includes distributing throughout the body of the paper (or of the upper part at least) during its manufacture a chemically-reactive finely-divided metal or a chemically-reactive finely-divided metal oxide, or both. There is also claimed a safety paper having distributed throughout the body of the upper part at least a finely-divided chemically-reactive metal. It was stated in the specification that it is not necessary in all cases for the metal to be added in as fine a form as possible, and that iron powder passing a sieve having 180 meshes per linear inch is, for example, quite suitable.

I have now found that definite advantages are secured by employing particles of chemically-reactive metal or metal oxide which are of smaller dimensions than those indicated in the parent specification. According to the present invention therefore, there is employed in the manufacture of the safety paper a chemically-reactive metal or metal oxide, especially metallic iron, which is so finely divided that it will all pass through a 200 mesh sieve and at least 90% and preferably 95% or over will pass through a 300 mesh sieve. Alternatively, the material may be so finely divided that it will all pass through a 240 mesh sieve. I refer to the British Standard Wire Cloth sieves constructed according to the specifications of the British Standards Institution.

The use of finely divided metal of the degree of fineness specified in the manufacture of safety paper, more especially in the case of metallic iron, minimises the wear on printers' blocks, more especially those designed to give very fine patterns

[*Price* 1/-]

body of one or more of the layers. Thus, it is possible in the case of multiply paper to incorporate the finely-divided metal or metal oxide in one of the under-plies, e.g., the middle ply in the case of a three-ply paper. In such event, there will be no risk of the particles being present actually in the surface of the paper, although their presence in the body of the paper would still result in their serving as security ingredients. It may further be advantageous, for example, when using finely-divided metals such as iron, to incorporate particles in the surface ply which are sufficiently fine to pass through a 200 mesh sieve or a 240 mesh sieve, or of a like degree of fineness, and to incorporate in an under-ply somewhat coarser particles, for example, such as will pass through a 150 mesh sieve, and would be largely retained by a 240 mesh sieve. In addition, or alternatively, an inner layer in the paper may contain a larger proportion of the finely-divided metal or metal oxide than the outer layer.

It will be apparent also, that in manufacturing multi-ply security papers, different security ingredients may be incorporated in the respective layers. Thus, for example, a finely-divided metal may be incorporated in one layer and a finely-divided metal oxide in another layer, or known security ingredients may be incorporated in one layer and a finely-divided metal or metal oxide incorporated in another layer. A further feature of the present invention, threfore, consists in incorporating respectively in different layers of a multi-ply paper, preferably adjacent layers, substances adapted to react with one another in the presence of

Price

Price 4s 6d

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PROVISIONAL SPECIFICATION

Improvements in and relating to Security Paper

I, DAVID RUSSELL, a British Subject, of Rothes, Markinch, in the County of Fife, do hereby declare the nature of this invention to be as follows:—

This invention relates to improvements in security paper, and more particularly to improvements in the safety paper and process for its production which is described and claimed in my prior patent application No. 437,969.

In the aforesaid prior patent application, there is described and claimed a process for the production of a safety paper which includes distributing throughout the body of the paper (or of the upper part at least) during its manufacture a chemically-reactive finely-divided metal or a chemically-reactive finely-divided metal oxide, or both. There is also claimed a safety paper having distributed throughout the body of the upper part at least a finely-divided chemically-reactive metal. It was stated in the specification that it is not necessary in all cases for the metal to be added in as fine a form as possible, and that iron powder passing a sieve having 180 meshes per linear inch is, for example, quite suitable.

I have now found that definite advantages are secured by employing particles of chemically-reactive metal or metal oxide which are of smaller dimensions than those indicated in the parent specification. According to the present invention therefore, there is employed in the manufacture of the safety paper a chemically-reactive metal or metal oxide, especially metallic iron, which is so finely divided that it will all pass through a 200 mesh sieve and at least 90% and preferably 95% or over will pass through a 300 mesh sieve. Alternatively, the material may be so finely divided that it will all pass through a 240 mesh sieve. I refer to the British Standard Wire Cloth sieves constructed according to the specifications of the British Standards Institution.

The use of finely divided metal of the degree of fineness specified in the manufacture of safety paper, more especially in the case of metallic iron, minimises the wear on printers' blocks, more especially those designed to give very fine patterns or impressions. Moreover, such particles as may happen to be upon the surface of the paper are less likely to be visible and accordingly there is less risk of their visibility affecting any pattern or design of minute character which may have to be printed upon the paper.

I have further found that similar advantages can be secured by manufacturing a multi-ply paper and incorporating the finely-divided metal or metal oxide between the individual layers or in the body of one or more of the layers. Thus, it is possible in the case of multiply paper to incorporate the finely-divided metal or metal oxide in one of the under-plies, e.g., the middle ply in the case of a three-ply paper. In such event, there will be no risk of the particles being present actually in the surface of the paper, although their presence in the body of the paper would still result in their serving as security ingredients. It may further be advantageous, for example, when using finely-divided metals such as iron, to incorporate particles in the surface ply which are sufficiently fine to pass through a 200 mesh sieve or a 240 mesh sieve, or of a like degree of fineness, and to incorporate in an under-ply somewhat coarser particles, for example, such as will pass through a 150 mesh sieve, and would be largely retained by a 240 mesh sieve. In addition, or alternatively, an inner layer in the paper may contain a larger proportion of the finely-divided metal or metal oxide than the outer layer.

It will be apparent also, that in manufacturing multi-ply security papers, different security ingredients may be incorporated in the respective layers. Thus, for example, a finely-divided metal may be incorporated in one layer and a finely-divided metal oxide in another layer, or known security ingredients may be incorporated in one layer and a finely-divided metal or metal oxide incorporated in another layer. A further feature of the present invention, threfore, consists in incorporating respectively in different layers of a multi-ply paper, preferably adjacent layers, substances adapted to react with one another in the presence of

[*Price* 1/-]

Price 33p

Price 4s 6d

moisture to produce coloured bodies. Thus, there may be incorporated in one layer a colourless sulphide and in another layer, preferably an adjacent layer, a metal or an oxide or salt of a metal which has a highly coloured or black sulphide, so that reaction will occur with the production of such coloured or black sulphide when moisture or ink-eradicating chemicals are applied to the paper. It will be apparent also, that the ingredient which is incorporated in one of the inner layers may be a coloured body without materially affecting the colour of the surface of the paper, which is largely determined by the surface layer.

Dated this 15th day of January, 1936.

W. P. THOMPSON & CO.,
12, Church Street, Liverpool, 1,
Chartered Patent Agents.

COMPLETE SPECIFICATION

Improvements in and relating to Security Paper

I, DAVID RUSSELL, a British Subject, of Rothes, Markinch, in the County of Fife, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to improvements in security paper, and more particularly to improvements in the safety paper and process for its production which is described and claimed in my prior patent No. 437,969.

In the specification of the aforesaid prior patent, there is described and claimed a process for the production of a safety paper which includes distributing throughout the body of the paper (or of the upper part at least) during its manufacture a chemically-reactive finely-divided metal or a chemically-reactive finely-divided metal oxide, or both. There is also claimed a safety paper having distributed throughout the body of the upper part at least a finely-divided chemically-reactive metal. It is stated in that specification that it is not necessary in all cases for the metal to be added in as fine a form as possible, and that iron powder passing a sieve having 180 meshes per linear inch is, for example, quite suitable.

I have now found that definite advantages are secured by employing particles of chemically-reactive metal or metal oxide which are of smaller dimensions than those indicated in the parent specification. These advantages result when there is employed in the manufacture of the safety paper a chemically-reactive metal or metal oxide, especially metallic iron, which is so finely divided that it will all pass through a 200 mesh sieve and at least 90% and preferably 95% or over will pass through a 300 mesh sieve. Alternatively, the material may be so finely divided that it will all pass through a 240 mesh sieve. I refer to the British Standard Wire Cloth sieves constructed according to the specifications of the British Standards Institution.

The use of finely divided metal of the degree of fineness specified in the manufacture of safety paper, more especially in the case of metallic iron, minimises the wear on printer's blocks, more especially those designed to give very fine patterns or impressions. Moreover, such particles as may happen to be upon the surface of the paper are less likely to be visible and accordingly there is less risk of their visibility affecting any pattern or design of minute character which may have to be printed upon the paper.

I have further found that similar advantages can be secured by manufacturing a multi-ply paper and incorporating the finely-divided metal or metal oxide between the individual plies or in the body of one or more of the plies. Thus, it is possible in the case of multi-ply paper to incorporate the finely-divided metal or metal oxide in one of the underplies, e.g., the middle ply in the case of a three-ply paper. In such event, there will be no risk of the particles being present actually in the surface of the paper, although their presence in the body of the paper will still result in their serving as security ingredients. It may further be advantageous, for example, when using finely-divided metals such as iron, to incorporate particles in the surface ply which are sufficiently fine to pass through a 200 mesh sieve or a 240 mesh sieve, or of a like degree of fineness, and to incorporate in an underply somewhat coarser particles, for example, such as will pass through a 150 mesh sieve, and would be largely retained by a 240 mesh sieve. In addition, or alternatively, an inner ply of the paper may contain a larger proportion of the finely-divided metal or metal oxide than the outer plies.

Suitable finely divided metals which, or whose oxides may be employed in practising the present invention are iron, nickel, cobalt, manganese and copper or mixtures thereof. The amount may be

from 1 to 4% by weight of the paper in which the metal or oxide is incorporated.

It will be apparent also, that in manufacturing multi-ply security papers, different security ingredients may be incorporated in the respective plies. Thus, for example, a finely-divided metal may be incorporated in one ply and a finely-divided metal oxide in another ply or known security ingredients may be incorporated in one ply and a finely-divided metal or metal oxide incorporated in another ply. Or, alternatively, there may be incorporated respectively in different plies of a multi-ply paper, preferably adjacent plies, a finely divided metal or metal oxide and a substance adapted to react with such metal or metal oxide in the presence of aqueous liquids to produce coloured bodies. Thus, there may be incorporated in one ply a colourless sulphide and in another ply, preferably an adjacent layer, a metal or an oxide or salt of a metal which has a highly coloured or black sulphide, so that reaction will occur with the production of such coloured or black sulphide when moisture or ink-eradicating chemicals are applied to the paper. It will be apparent also, that the ingredient which is incorporated in one of the inner plies may be a coloured body without materially affecting the colour of the surface of the paper, which is largely determined by the surface ply.

The amount of such other substance employed may be, for example, 1 to 4% by weight of the paper in which the ingredient is incorporated.

Where I refer to substances adapted to react with one another in the presence of aqueous liquids I mean such liquids as are commonly used as ink eradicators e.g. dilute solutions of acids e.g. citric, tartaric or oxalic, acid salts such as salts of sorrel or oxidising agents such as hypochlorites, alone or in conjunction with such acids or alkaline hydrogen peroxide.

The materials and amounts indicated above are purely by way of example. It is possible for example to use higher proportions of ingredients which are light coloured or colourless than of dark or highly coloured ingredients.

Examples of Two Ply Papers.

1. One ply contains 1—2½% of iron, copper, nickel or cobalt sufficiently finely divided to pass a 240 mesh sieve. The other ply contains 3 to 6% of manganese ferrocyanide or lead ferrocyanide or zinc ferrocyanide or calcium ferrocyanide or calcium thiocyanate.

2. One ply contains 0.01 to 0.25% of precipitated ferric hydroxide. The other ply contains 3 to 6% of any of the above ferrocyanides or thiocyanate.

In manufacturing safety papers containing metals or metallic compounds according to the present invention it is important to keep the paper substantially neutral during its treatment in order to avoid premature development of colour. Generally, the *p*H of the pulp suspension and the machine liquors should be maintained between 6.8 and 7.2.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. The improvement in or modification of the invention claimed in the parent patent according to which the chemically reactive metal or metal oxide is so finely divided that it will all pass through a 200 mesh sieve and at least 90% will pass through a 300 mesh sieve.

2. The improvement in or modification of the invention claimed in the parent patent according to which the chemically reactive metal or metal oxide is so finely divided that it will all pass through a 240 mesh sieve.

3. The improvement in or modification of the invention claimed in the parent patent or in claims 1 and 2 hereof according to which the chemically reactive finely divided metal or metal oxide is incorporated in one or more of the plies of a multi-ply paper.

4. The improvement in or modification of the invention claimed in the parent patent or in claims 1 and 2 hereof according to which the chemically reactive finely divided metal or metal oxide is incorporated wholly or mainly in one or more of the inner plies of a multi-ply paper.

5. The improvement in or modification of the invention claimed in the parent patent according to which chemically reactive finely divided metal or metal oxide of the character defined in claims 1 or 2 hereof is incorporated in the outer plies of a multi-ply paper and chemically reactive finely divided metal or metal oxide which will pass through a 150 mesh sieve but will be largely retained by a 240 mesh sieve is incorporated in one or more of the inner plies.

6. The improvement in or modification of the invention claimed in the parent patent according to any of claims 3 to 5 hereof and in which one or more inner plies contain a larger proportion of finely divided metal or metal oxide than the outer plies.

7. The improvement in or modification of the invention claimed in the parent patent according to any of claims 3 to 6 hereof in which finely divided metal is incorporated in one ply and finely divided

metal oxide in another ply.

8. The improvement in or modification of the invention claimed in the parent patent according to claim 3 hereof in which finely divided metal or metal oxide is incorporated in one ply and a known security ingredient in another ply.

9. The improvement in or modification of the invention claimed in the parent patent according to claim 3 hereof in which there are incorporated respectively in different plies of a multi-ply paper a finely divided metal or metal oxide and a substance adapted to react with such metal or metal oxide in the presence of aqueous liquids to produce coloured bodies.

10. The improvements in or modifications of the invention claimed in the parent patent, substantially as herein described.

Dated this 15th day of January, 1937.

W. P. THOMPSON & CO.,
12, Church Street, Liverpool, 1,
Chartered Patent Agents.

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